

CLAIMS

We claim:

1 1. A computer implemented method comprising:
2 determining a set of endpoints for a generic routing encapsulation (GRE) tunnel;
3 determining a key, the key corresponding to a virtual private network (VPN);
4 dynamically establishing the GRE tunnel with the set of endpoints and the key;
5 and
6 processing a set of GRE traffic for the VPN.

1 2. The computer implemented method of claim 1 wherein the set of points comprise
2 a first value indicating a first virtual router, the first virtual router corresponding to the
3 VPN, a second value indicating a second virtual router, a third value indicating a third
4 virtual router, the second and third virtual routers corresponding to a backbone, and a
5 fourth value indicating a fourth virtual router, the fourth virtual router corresponding to
6 the VPN.

1 3. The computer implemented method of claim 1 wherein dynamically establishing
2 the GRE tunnel comprises:
3 establishing a first subset of the set of endpoints for entering and exiting the VPN;
4 and
5 establishing an initiation point and a termination point for the GRE tunnel with a
6 second subset of the set of endpoints.

1 4. A computer implemented method comprising:
2 determining a first set of endpoints for a generic routing encapsulation (GRE)
3 tunnel;
4 determining a key, the key corresponding to a virtual private network (VPN);
5 using the key and the set of endpoints to determine a second set of endpoints for
6 the VPN;
7 establishing the GRE tunnel with the set of attributes; and
8 processing a set of traffic for the VPN.

1 5. The computer implemented method of claim 4 wherein the first set of endpoints
2 comprise a first value indicating a first virtual router, the first virtual router being an
3 initiation point of the GRE tunnel, and a second value indicating a second virtual router,
4 the second virtual router being a termination point for the GRE tunnel.

1 6. The computer implemented method of claim 4 wherein the second set of
2 endpoints comprise a first value indicating a first virtual router corresponding to the VPN,
3 and a second value indicating a second virtual router, the second virtual router
4 corresponding to the VPN.

1 7. The computer implemented method of claim 4 wherein the second set of
2 endpoints and the set of attributes are each indexed by the key and the first set of
3 endpoints.

1 8. A system comprising:
2 a first network element to determine a key and a first set of endpoints for a generic
3 routing encapsulation (GRE) tunnel, the key corresponding to a virtual
4 private network (VPN), to determine a second set of endpoints for the
5 GRE VPN, to configure an initiation point of the GRE tunnel, to transmit a
6 packet having the first set of end points and the key; and
7 a second network element coupled with the first network element, the second
8 network element to receive the packet, to determine the second set of
9 endpoints for the GRE VPN, and to establish the GRE tunnel.

1 9. The system of claim 8 further comprising a third network element, the third
2 network element coupled with the first and the second network element, the third network
3 element to receive a set of data from the first network element and forward the set of data
4 to the second network element, the set of data being for the VPN.

1 10. The system of claim 8 wherein the second set of endpoints are indexed by the first
2 set of endpoints and the key.

1 11. The system of claim 8 wherein to configure the initiation point comprises to
2 configure one of the second set of endpoints to one of the first set of endpoints.

1 12. An apparatus comprising:
2 a control engine to retrieve a first set of endpoints corresponding to a generic
3 routing encapsulation (GRE) tunnel, to retrieve a second set of endpoints
4 corresponding to the first set of endpoints and a key, the key
5 corresponding to a virtual private network (VPN); and
6 a forwarding engine coupled with the control engine, the forwarding engine to
7 establish an initiation point of the GRE tunnel and to transmit a set of
8 traffic over the GRE VPN.

1 13. The apparatus of claim 11 wherein the forwarding engine to host a first and
2 second virtual router, the first virtual router corresponding to one of the first set of
3 endpoints and the second virtual router corresponding to one of the second set of
4 endpoints.

1 14. The apparatus of claim 11 wherein the second set of endpoints are indexed by the
2 key and the first set of endpoints.

1 15. An apparatus comprising:
2 an input/output module to receive a set of data, the set of data indicating a key and
3 a first of set of endpoints of a generic routing encapsulation GRE tunnel,
4 the key corresponding to a virtual private network (VPN); and
5 a control engine coupled with the input/output module, the control engine to
6 determine a second set of endpoints for the VPN with the key and the first
7 set of endpoints; and
8 a forwarding engine coupled with the control engine and the input/output module,
9 the forwarding engine to dynamically establish the GRE tunnel with the
10 first set of endpoints and the second set of endpoints and to process a set of
11 traffic for the VPN.

1 16. The apparatus of claim 15 wherein the second set of endpoints are indexed by the
2 key and the first set of endpoints.

1 17. The apparatus of claim 15 wherein to establish the GRE tunnel comprises:
2 to configure one of the second set of endpoints to one of the first set of endpoints;
3 and
4 to indicate the key in a list of keys.

1 18. A machine-readable medium that provides instructions, which when executed by a
2 set of one or more processors, cause said set of processors to perform operations
3 comprising:
4 retrieving a first set of endpoints of a generic routing encapsulation (GRE) tunnel
5 with a generic routing encapsulation (GRE) tunnel name;
6 determining a second set of endpoints with the first set of endpoints and a key, the
7 key corresponding to a virtual private network (VPN);
8 establishing an initiation point of the GRE tunnel with the first set of endpoints
9 and the second set of endpoints;
10 transmitting the first set of endpoints and the key; and
11 transmitting a set of traffic over the GRE VPN.

1 19. The machine-readable medium of claim 18 wherein the establishing the initiation
2 point of the GRE tunnel comprises configuring one of the second set of endpoints to one
3 of the first set of endpoints.

1 20. The machine-readable medium of claim 18 further comprising:
2 receiving a second set of traffic for a second VPN, the second set of traffic
3 indicating the GRE tunnel;
4 determining a third set of endpoints with a second key and the first set of
5 endpoints, the second key corresponding to the second VPN;
6 configuring one of the third set of endpoints to one of the first set of endpoints;
7 transmitting the second key and the first set of endpoints; and
8 transmitting the second set of traffic.

1 21. A machine-readable medium that provides instructions, which when executed by a
2 set of one or more processors, cause said set of processors to perform operations
3 comprising:

4 listening for a packet, the packet indicating a first set of endpoints for a generic
5 routing encapsulation (GRE) tunnel and a key, the key corresponding to a
6 virtual private network (VPN);

7 receiving the packet;

8 retrieving a second set of endpoints for the VPN with the first set of endpoints and
9 the key;

10 establishing the GRE tunnel with the first set of endpoints and the second set of
11 endpoints; and

12 processing a set of traffic over the GRE VPN.

1 22. The machine-readable medium of claim 21 wherein establishing the GRE tunnel
2 comprises:

3 configuring one of the second set of endpoints to one of the first set of endpoints;

4 and

5 maintaining the key in a list of keys.

1 23. The machine-readable medium of claim 21 further comprising:

2 receiving a second packet, the second packet indicating the first set of endpoints
3 and a second key, the second key corresponding to a second VPN;

4 retrieving a third set of endpoints with the second key and the first set of
5 endpoints;

6 receiving a second set of traffic; and

7 forwarding the second set of traffic to one of the third set of endpoints.

1 24. The machine-readable medium of claim 21 further comprising:

2 receiving a second packet, the second packet indicating a second key;

3 determining that the second key is not in a key list; and

4 ensuring that the second packet originated from an interior source.